
Executive Summary

This report is the 11th in a series of biennial reports on the status of women and minorities in science and engineering. The reports are mandated by the Science and Engineering Equal Opportunities Act (Public Law 96-516), which was amended in 1998 to include persons with disabilities. The primary purpose of this report is as an information source on the participation of women, minorities, and persons with disabilities in science and engineering.

Changes since the last report in this series

The 2000 edition examined changes in participation since the first report in this series was released in 1982. That report found that many of the findings of the 1982 report continued to be the case in 2000. Among these are the relatively small percentages of women and minorities who earn S&E degrees and who are employed in S&E, the concentration of women and minorities in specific fields, the higher rates of part-time employment and unemployment for women than for men, the lower salaries earned by women than by men, the lower salaries earned by minorities than by whites, and the lower percentages of women than of men in full professorships. The first *Women and Minorities in Science and Engineering* report in 1982 did not present data on persons with disabilities.

Like its predecessors, the current report found differences between men and women and among racial/ethnic groups in high school completion rates, college enrollment rates, field choice, employment, rank and tenure status, salaries, and work activities. Although women are more likely than men to complete high school and to enroll in college, they are less likely than men to choose S&E fields—at all levels of education and in employment. Within science and engineering, women are more prevalent in some fields—psychology, the social sciences, and the biological sciences—than others. Women are more likely than men to be employed part time and to be unemployed; women doctoral scientists and engineers employed in educational institutions are less likely than men to be tenured or to have the rank of full professor; and women scientists and engineers receive lower salaries than men.

The high school completion and college enrollment rates of blacks and Hispanics continue to increase, and the numbers and percentages of members of these groups who

complete bachelor's, master's and doctoral degrees in S&E are also growing. However, they remain less likely than whites and Asians to graduate from high school, enroll in college, and graduate from college. Bachelor's and master's degree field choice is now similar among whites, blacks, Hispanics, and American Indians. Blacks, Hispanics, and American Indians earn roughly the same percentage of all S&E degrees as they do of non-S&E bachelor's degrees.

There are differences in the educational attainment and S&E labor force participation rates of persons with and without disabilities. Students with disabilities are less likely than those without to graduate from high school, to enroll in college, and to graduate from college. Among scientists and engineers, one-third of those with disabilities were out of the labor force in 1997, compared with 11 percent of those without disabilities. Scientists and engineers with disabilities also had higher unemployment rates than those without. Students with and without disabilities differ little, however, in undergraduate major and S&E occupation, and relatively few differences exist between scientists and engineers with and without disabilities in terms of salaries, percentages in management, percentages that are full professors, and field distribution.

Recent trends have shown some improvements in areas that were identified as specific concerns in the previous report—the declining numbers and percentages of women in computer science and the declining numbers and percentages of minorities in engineering. In computer science, the numbers of women and men earning bachelor's degrees in 1998 rose substantially—by 8 percent for women and 9 percent for men; this was the second consecutive increase for women and the fourth consecutive increase for men. Women continued to account for 27 percent of all computer science bachelor's degree recipients. In engineering, both the numbers of Asian, black, Hispanic, and American Indian undergraduates and their percentages of engineering enrollment increased in the 1990s; concurrently, the number of white engineering students decreased.

Results are mixed regarding the effects of changes in legislation or policy on graduate enrollment. Two of the other specific issues addressed in the previous report—the higher attrition rates of minorities in undergraduate education and the paucity of data on persons with disabilities in S&E education—continue to be cause for concern.

New concerns

In addition to the trends and issues that have persisted over time, several new concerns have been raised in the last few years:

- The “digital divide”: differences in access to computer technology by sex, race/ethnicity, and disability status
- International differences in participation of women in S&E
- The decline in male enrollment
- Changing demographics: growth and diversity in the Asian population
- Defining disability: changes over time and differences among sources

The digital divide

Computer and Internet access are becoming increasingly important in American society. According to the Department of Commerce, the share of households with Internet access rose from 26 percent in 1998 to 42 percent in 2000, and the share that have computers rose from 42 percent in 1998 to 51 percent in 2000.¹ Concern has been raised about a digital divide in the United States between computer “haves” and “have-nots” and the extent to which this digital divide can exacerbate existing inequalities. One area in which this concern has been particularly focused is education. Although availability of computers in the classroom has grown over the past decade, teachers in schools with a high percentage of minority students were less likely than those in schools with a low percentage of minority students to have computers and to have access to the Internet. They were more likely to report that they had outdated, incompatible, or unreliable computers. Teachers in schools with a high percentage of minority students were less likely than teachers in schools with a low percentage of minority students to use computers or the Internet for a wide range of activities—for example, for Internet research and creating instructional materials.

Availability and accessibility of computers is also an issue for students with disabilities. Barriers to use of advanced telecommunications by students with disabilities include insufficiently trained special education teachers (cited by 47 percent of public schools surveyed), not enough computers available to students with disabilities (34 percent), not enough computers with alternative input/output devices (38 percent), and inadequate evaluation and support services to meet the special technology needs of students (39 percent).

¹U.S. Department of Commerce, *Falling Through the Net: Toward Digital Inclusion*, report of a joint study by the Economics and Statistics Administration and the National Telecommunications and Information Administration (2000), <http://www.esa.doc.gov/fttn00.htm>.

International differences in participation of women in S&E

Increasing global competition, the worldwide expansion of S&E education, and the recent release of the latest international study of science and mathematics education have resulted in increased attention to international differences in S&E education and employment. Although the United States is among the top countries in the world in terms of numbers and percentages of first university degrees in S&E earned by women, Italy, Spain, and France award far higher percentages of doctoral degrees in the natural sciences to women (68, 44, and 41 percent, respectively) than is the case in the United States (32 percent).

The decline in male enrollment

The decline in the percentage of undergraduates who are male (from 58 percent in 1968 to 44 percent in 1997) at the same time that the proportion of college-aged individuals who are male has increased² has been the subject of numerous conferences and articles, and has led to some calls for “affirmative action” for males. Declining percentages of males have occurred in total enrollment, total bachelor’s degrees, and S&E bachelor’s degrees, and exist across all racial/ethnic groups. Looking more closely, however, it is only the numbers of *white* male students that have actually decreased; the numbers of Asian, black, Hispanic, and American Indian male undergraduates have in fact increased since 1984. Thus, in the case of these racial/ethnic minorities, the decrease in the percentage of undergraduates who are male is attributable to a more rapid increase in the number of females than of males. The greatest disparity between male and female enrollment and degree attainment occurs among minorities and low-income students. In the case of whites, the decrease in the percentage of undergraduates who are male is attributable to a decline in the number of male students concurrent with an increase in the number of female students. Recent (1991 through 1997) declines in white male undergraduate enrollment were concurrent with declines in the white college-age (18- to 24-year-old) population.

Growth and diversity in the Asian population

According to the latest U.S. Bureau of the Census projections for the population of the United States, minorities (Asians, blacks, Hispanics, and American Indians) are expected to be close to half (47 percent) of the resident population by 2050. As of 1999, they collectively constituted

²U.S. Bureau of the Census, *Statistical Abstract of the United States: 1999* (Washington, DC, 1999).

28 percent of the population. By 2050, non-Hispanic whites should constitute 53 percent of the U.S. population, down from 72 percent in 1999.

Due to immigration trends, the largest growth is projected in the numbers and percentages of Hispanics and Asians. Asians are expected to increase from 4 percent of the U.S. population in 1999 to 9 percent in 2050, and Hispanics from 12 to 24 percent. Relatively little growth is projected for non-Hispanic blacks and American Indians; these groups would increase from 12 to 13 percent and from 0.7 to 0.8 percent, respectively.

Asians, although a small percentage of the population, are not considered underrepresented in science and engineering. Asians were 4 percent of the U.S. population in 1999 and 11 percent of the people employed in S&E occupations in that same year. Asians, though, are a large and diverse population, comprising many groups that differ in language, culture, and length of residence in the United States. Representation in S&E among these subgroups may in fact vary greatly, but data are generally not available for Asian subgroups.

Defining disability: Changes over time

Increases in the numbers and percentages of students with disabilities over time reflect changes in definitions and in the distribution of types of disabilities, as well as increases in opportunity. The percentage of college freshmen who reported having disabilities increased from less than 3 percent in 1978 to 9 percent in 2000. Much of this increase reflects an increase in students reporting learning disabilities; this category grew from 15 percent of those with disabilities in 1988 to 41 percent in 1998. Freshmen who had learning disabilities were more likely than freshmen with other

disabilities to be white and to have significantly higher parental income. The percentage of students with other disabilities decreased from 1988 to 1998—students with visual impairments decreased from 31 percent of freshmen with disabilities to 13 percent; students with orthopedic impairments dropped from 14 to 9 percent.

Elementary and secondary students participating in Federal programs for children with disabilities have been increasing both in number and as a fraction of total public school enrollment. Between 1990 and 1999, the number of students who participated in Federal programs for children with disabilities increased 30 percent, rising from 4.3 million to 5.5 million students. Part of this growth is due to an increase in the number of students identified with specific learning disabilities. This type of disability continued to be the most prevalent one, with 51 percent of all students ages 6 through 21 participating in Federal programs for children with disabilities identified as having specific learning disabilities. Students with specific learning disabilities increased from approximately 2.1 million to 2.8 million students from 1989/90 to 1998/99. The number of students with “other health impairments” also went up dramatically during this period—from approximately 53,000 students (or 1 percent of all students with disabilities ages 6 through 21) in 1989/90 to approximately 221,000 students (or 4 percent of the total) in 1998/99. The increase in the number of children with “other health impairments” is largely due to increases in the identification and provision of services to children with attention deficit disorder and attention deficit hyperactivity disorder, two recently established disability labels that do not constitute a separate category. Concurrent with these numerical increases, progress has been made in serving students in most disability categories in more inclusive settings.